

Recommended Master Plan Concept

The airport master planning process for Phoenix Deer Valley Airport (DVT) has evolved through the development of forecasts of future demand, an assessment of future facility needs, and the evaluation of airport development alternatives to meet those future facility needs. The planning process has included the development of four sets of working papers which were presented to the Planning Advisory Committee (PAC) and discussed at several coordination meetings and public information workshops. The City of Phoenix has participated in each of these meetings and has been actively involved in the master planning process.

The PAC was comprised of several constituencies with a stake in the Phoenix Deer Valley Airport. Groups represented on the PAC included the Federal Aviation

Administration (FAA), the Arizona Department of Transportation - Aeronautics Division, the City of Phoenix Department of Aviation, the City of Phoenix, Maricopa Association of Governments (MAG), Luke Air Force Base, airport management, airport traffic control tower personnel, airport fixed base operators (FBOs), pilot associations, and residents in the vicinity of the airport. This diverse group has provided valuable input into this recommended plan.

In the previous chapter, several development alternatives were analyzed to explore options for the future growth and development of Phoenix Deer Valley Airport. The development alternatives were refined into a single recommended concept for the master plan. This chapter describes, in narrative and



graphic form, the recommended direction for the future use and development of Phoenix Deer Valley Airport.

RECOMMENDED MASTER PLAN CONCEPT

The recommended master plan concept most closely resembles Airport Development Alternative 2 and Landside Alternative A as presented in Chapter Four – Airport Alternatives. This combined concept provides a balance between forecast operations and forecast growth in based aircraft. As discussed, the maximum operational capacity that the airport can accommodate is forecast to be exceeded, which limits the number of based aircraft that the airport should be planned to accommodate.

The recommended master plan concept, as presented on **Exhibit 5A**, presents an ultimate configuration for the airport that meets FAA design standards, enhances safety, increases overall airport capacity, and provides a variety of aircraft storage options. A phased program to implement the recommended development configuration will be presented in Chapter Six - Capital Program.

The following sub-sections will describe the recommended master plan concept in detail.

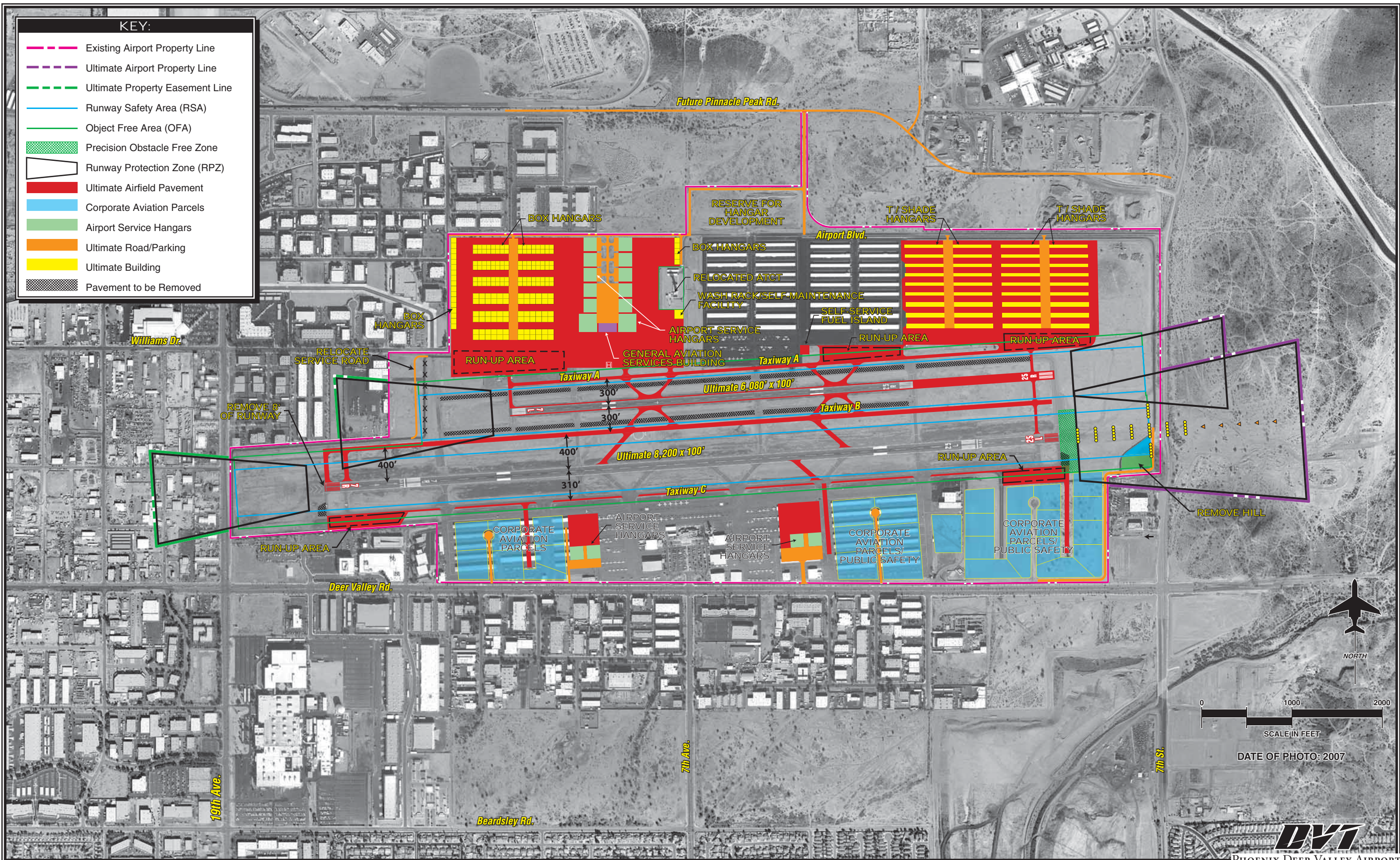
AIRFIELD DESIGN STANDARDS

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the

imaginary surfaces surrounding them, which provide for the safe operation of aircraft at the airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, FAA design criteria primarily center on the airport's critical design aircraft. The critical aircraft is the most demanding aircraft or family of aircraft which currently, or are projected to, conduct 500 or more operations (take-offs and landings) per year at the airport. Factors included in airport design are an aircraft's wingspan, tail height, approach speed, and, in some cases, the instrument approach capability for each runway. The FAA has established the Airport Reference Code (ARC) to relate these critical aircraft factors to airfield design standards.

Analysis conducted in Chapter Three - Facility Requirements concluded that the current critical aircraft is defined by the family of larger general aviation business jets that fall into ARC C-II (approach speeds less than 121 knots, wingspans less than 79 feet). This category of aircraft would include business jets such as the Challenger 600, Cessna Citation models 650, 680, and 750, Hawker 800XP and 1000, and Falcon 900EX and 2000. Larger aircraft, such as the Gulfstream IV (ARC D-II) and the Gulfstream V (ARC D-III), also contribute to the critical aircraft determination. Large business jets are forecast to continue to define the critical aircraft for the airport into the future. Future planning considers a critical aircraft in ARC D-III.



It is not necessary to design all airfield and landside elements to the same design standards. Varying design standards can be applied to runways and taxiways based upon the role of the runway and the aircraft that frequently use that runway or taxiway. For example, taxilanes providing access to T-hangar areas can be designed to accommodate smaller piston aircraft since T-hangars typically cannot accommodate a large jet aircraft. **Table 5A** summarizes the airport design standards to be applied to the ultimate design of Phoenix Deer Valley Airport, as well as a comparison to the current design requirements.

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TABLE 5A Airfield Planning Design Standards (Ultimate) Phoenix Deer Valley Airport			
	Ultimate Runway 7R-25L	Interim Runway 7L-25R	Ultimate Runway 7L-25R
DESIGN STANDARDS			
Airport Reference Code (ARC)	D-III	B-I	C-II
Design Aircraft	G-V	King Air 100	Challenger 604
Lowest Visibility Minimum	1 Mile/0.5 Mile	1 Mile	1 Mile
Runways			
Length (ft.)	8,200	4,500	6,080
Width (ft.)	100	75	100
Pavement Strength (lbs.)			
Single Wheel Loading (SWL)	60,000	70,000	70,000
Dual Wheel Loading (DWL)	90,000	117,000	117,000
Shoulder Width (ft.)	20	10	10
Runway Safety Area			
Width (ft.)	500	120	500
Length Beyond Runway End (ft.)	1,000	240	1,000
Length Prior to Landing (ft.)	600	240	600
Object Free Area			
Width (ft.)	800	400	800
Length Beyond Runway End (ft.)	1,000	240	1,000
Obstacle Free Zone			
Width (ft.)	400	250	400
Length Beyond Runway End (ft.)	200	200	200
Taxiways			
Width (ft.)	50	25	35
OFA (ft.)	186	89	131
Centerline to Fixed or Movable Object (ft.)	93	45	66
Runway Centerline to:			
Parallel Taxiway Centerline (ft.)	400 (310)*	225	300
Aircraft Parking Area (ft.)	500	200	400
Building Restriction Line (ft.)			
20 ft. Height Clearance	640	390	640
35 ft. Height Clearance	745	495	745
Runway Protection Zones			
Inner Width (ft.)	500/1000	500	500
Outer Width (ft.)	1,010/1750	700	1,010
Length (ft.)	1,700/2500	1,000	1,700
Approach Slope (Threshold Siting Surface)	34:1	20:1	20:1
Departure Surface	40:1	40:1	40:1
*Taxiway B planned for 400' separation; Taxiway C planned for 310' separation. Source: FAA Advisory Circular 150/5300-13, Airport Design, Change 10			

AIRSIDE RECOMMENDATIONS

The airside recommendations primarily focus on meeting the safety area standards for the runway and taxiway system and providing for increased capacity at the airport. Of primary consideration is meeting FAA design standards for the runway safety area (RSA), object free area (OFA), obstacle free zone (OFZ), and runway protection zone (RPZ). Additional recommendations for the strategic acquisition of property adjacent to the airport to insure compatible land uses surrounding the airport are made.

Runway 7R-25L

The RSA behind Runway 25L is penetrated by a 25-foot high hill and the perimeter service road. To meet RSA and OFA standards, the master plan recommends removal of the hill and relocation of the perimeter service road. In addition, the RSA is 500 feet wide, and the OFA is 800 feet wide as centered on the runway. These areas must be cleared, graded, have appropriate drainage, and be capable of supporting aircraft that stray from the runway as well as emergency vehicles. There can be no unusual ruts or humps in these areas. The current RSA may need to be re-graded as these irregularities exist along with exposed drainage culverts. These recommendations have also been made by the FAA Runway Safety Action Team (RSAT).

Currently, the Runway 7R landing threshold is displaced 897 feet, and the

Runway 25L landing threshold is displaced 930 feet. Analysis conducted indicates that both of these landing thresholds may be able to be relocated to the pavement ends. By doing this, greater landing length is available and the airport markings are “cleaner” as both the landing and departure thresholds are the same.

The approach to Runway 25L is considered for a Category I (CAT I) of approach. A CAT I approach can permit approaches down to one-half mile visibility with 200-foot cloud height ceilings. With the level of activity at the airport and the number of training operations increasing, a CAT I approach would satisfy a desire by airport users. To accommodate a CAT I approach, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) is currently required. Additional navigational equipment, such as a glideslope antenna and a localizer antenna, have also traditionally been required with the combination of the three, making up an Instrument Landing System (ILS).

With the FAA making rapid progress in development of CAT I approaches based on global positioning system (GPS) technology, rather than ground based navigational aids, there may not be a need for the glideslope and localizer antennas in the future. The recommended master plan concept assumes that only the approach lighting system will be required for a CAT I GPS approach. Runway 7R is considered to maintain its GPS approach with one mile visibility minimums.

Taxiway C runs parallel to the runway and provides access to the south terminal area. This taxiway is currently separated from the runway by 300 feet. The design standard for runway/taxiway separation is based on the wingspan of the critical aircraft and on the approach visibility minimums. For Phoenix Deer Valley Airport with a current critical aircraft in ARC C-II, the separation should be at least 300 feet. When the airport transitions to a critical aircraft in airplane design group (ADG) III or when a CAT I approach is pursued, the runway/taxiway separation increases to 400 feet.

Previous analysis indicated that relocation of Taxiway C to a distance of 400 feet would be extremely disruptive to existing facilities. This analysis indicated that a runway/taxiway separation of 310 feet would provide the necessary margin of safety for an aircraft with a 100-foot wing span. This wingspan was used as it approximates the wingspan of a Gulfstream V, which is forecast as the critical aircraft in the future, and encompasses nearly all business jets in the fleet. As a result, the master plan recommends adding 15 feet of pavement to the south side of Taxiway C and shifting the centerline to provide for the full 310-foot separation. Taxiway C would also be considered for widening from 40 feet to 50 feet at the same time in order to meet width standards for ADG III aircraft.

With the existing and forecast level of operations at Phoenix Deer Valley Airport, the need for aircraft run-up areas is accentuated. The master plan recommends development of aircraft run-up areas at both the east and west ends of Taxiway C to serve Runway 7R-25L. These run-up areas are much larger than typical hold aprons in order to accommodate multiple aircraft at the same time. The run-up areas will help increase airfield efficiency, reduce aircraft delay, and reduce overall airfield congestion.

The RPZs associated with both ends of primary Runway 7R-25L currently extend beyond airport property. It is recommended by the FAA that the airport have ownership of the RPZs where possible. This is in order to prevent incompatible land uses in the RPZ, such as residential development. In lieu of outright ownership of the RPZs, aviation easements (airspace ownership) should be pursued in order to prevent obstructions to the approach surface from developing.

Table 5B presents the land area recommended for acquisition to protect the RPZs. Land that is undeveloped is assumed to be available for fee simple purchase. Where the land is already developed, such as to the west of the airport, aviation easements are assumed with the understanding that fee simple acquisition is still preferred.

TABLE 5B
RPZ Property Acquisition
Phoenix Deer Valley Airport

	Runway 7R RPZ	Runway 25L RPZ	Parallel Runway 7L RPZ	Parallel Runway 25R RPZ	Total
Fee-simple Acquisition	NA	55.86	NA	7.34	63.20
Avigation Easement	17.46	NA	8.51	NA	25.97
NA – Not Applicable					

Taxiway B, to the north of Runway 7R-25L, currently extends from the Runway 25L threshold to Taxiway B3. The recommended master plan concept includes extending Taxiway B to the Runway 7R threshold and providing a bypass taxiway to the runway. This extension will increase airport capacity and efficiency by reducing the number of runway crossings necessary to transition from the north side of the airfield to the Runway 7R threshold for take-off.

Parallel Runway 7L-25R

The north side parallel runway is planned for an upgrade to enhance airport capacity and efficiency and to better meet the design and performance requirements of propeller aircraft. The runway currently measures 4,500 feet long by 75 feet wide and is designed to accommodate operations by single and multi-engine piston powered aircraft falling in ADG I. The master plan considers extending the runway east to Taxiway B13 and widening the runway to 100 feet. The ultimate length of Runway 7L-25R would be 6,080 feet.

Upgrading Runway 7L-25R allows this runway to serve a much greater percentage of the aircraft mix utilizing the

airport. A larger variety of business jets would now be able to utilize the runways if necessary. Runway 7L-25R would become capable of handling a larger percentage of the traffic mix during those times when the primary runway must be closed, typically due to maintenance. Upgrading Runway 7L-25R greatly expands the capability of the airport as a whole.

The runway upgrade would apply design standards for ARC C-II. The RSA surrounding the runway would increase in width from 120 feet to 500 feet, and the OFA width would increase from 400 to 800 feet. The length beyond the runway ends for both the RSA and OFA would increase from 240 feet to 1,000 feet. To accommodate the longer RSA and OFA, the airport service road to the west would need to be relocated approximately 100 feet to the west.

The runway/taxiway separation standards also increase when upgrading to ARC C-II. Currently, parallel Taxiways A and B are 200 feet from the runway centerline. To meet ARC C-II standards, both Taxiways A and B are accordingly relocated to the new standard separation of 300 feet. As depicted on the exhibit, eight high-speed taxiway

exits are added to the upgraded Runway 7L-25R. These exits have been strategically placed to allow for maximum benefit to airport capacity.

Extended aircraft run-up areas are also considered on both ends of Taxiway A. The need for these run-up areas is immediate, as identified by the FAA RSAT. Initial plans consider a run-up area immediately north of both thresholds. With the extension of this runway, a new run-up area is planned north of the ultimate threshold. These run-up areas will serve to reduce congestion, improve ground safety, and increase airport capacity.

Instrument approach procedures are considered for Runway 7L-25R. The master plan recommends GPS approaches to both runway ends with not lower than one mile visibility minimums. This type of approach should be adequate through the long term planning horizon.

The RPZs associated with the improvements planned for Runway 7L-25R would extend off airport property where the current RPZs do not. As previously presented, the RPZ area to the west of the airport would be considered for aviation easements, while the land to the east is considered for fee simple acquisition, if possible. **Table 5B** also presents the acres encompassed by these RPZs.

Airside Summary

The following list includes the major considerations for airside improvements at Phoenix Deer Valley Airport.

- Remove the hill in the RSA and OFA east of Runway 7R-25L and relocate service road.
- Remove approximately eight (8) feet of the west end of Runway 7R-25L.
- Improve the RSA by redesigning drainage culverts and removing ruts and humps.
- Utilize D-III Design Standards for Runway 7R-25L.
- Relocate landing thresholds on Runway 7R-25L to pavement ends.
- Relocate Taxiway C from 300 feet to 310 feet from Runway 7R-25L, or request a Modification to Standards.
- Provide run-up areas to serve all runway ends.
- Utilize C-II design standards for Runway 7L-25R
- Extend Runway 7L-25R 1,580 feet east for a total length of 6,080 feet.
- Widen Runway 7L-25R to 100 feet.
- Relocate Taxiway A from 200 feet to 300 feet from Runway 7L-25R.

- Relocate Taxiway B from 200 feet to 300 feet from Runway 7L-25R.
- Construct high speed taxiway exits in improve capacity.
- Install approach lighting system on Runway 25L for future precision approach.
- Acquire (fee simple) approximately 63 acres of property east of the airport for RPZ.
- Acquire (avigation easement) approximately 26 acres of property west of the airport for RPZ.

LANDSIDE PLANNING RECOMMENDATIONS

The primary goal of landside facility planning is to provide adequate aircraft storage space to meet the forecast need while also maximizing operational efficiencies and land uses. Achieving this goal yields a development scheme which segregates aircraft activity levels while maximizing the airport's revenue potential. Maximizing revenue potential helps lead to airport self-sufficiency, which is a goal shared by the FAA and the City of Phoenix. **Exhibit 5A** depicts the recommended landside development plan for the airport.

As previously discussed, separating aircraft with similar characteristics such as single engine piston powered aircraft from business jets provides for greater airport efficiency. In addition, separating destination facilities by activity

level will have the same positive effect on efficiency. Therefore, where possible, high activity airport services facilities such as FBOs and other aviation-related business are grouped together. Box or executive hangars are considered medium activity areas as corporate flight departments or specialty businesses may locate in these types of hangars. Low activity areas would include T-hangar areas. Landside planning groups these similar activity levels.

In the previous chapters, unconstrained based aircraft were forecast to grow from 1,252 in 2004 to 2,185 through the 20-year planning scope. It was further determined that the airport would be unable to accommodate all of this demand due to airfield capacity constraints. The analysis showed that the balance between operational capacity and based aircraft would be reached at approximately 1,856 based aircraft. Aircraft hangar space for 1,521 aircraft would be needed with 335 aircraft utilizing tie-down positions. Thus, landside planning considered facilities needed to meet this level of demand.

The vast majority of based aircraft growth is anticipated to be by owners of smaller single and multi-engine aircraft. This is consistent with national trends. Many of the owners of these aircraft will utilize traditional T-hangars, shade hangars, and tie-down positions. Some are also interested in a slightly larger aircraft storage facility that may offer additional amenities such as water and sewer. As a result, the plan includes a location for box/executive hangar development.

Cabin-class jet aircraft are forecast to have the strongest growth rate, quadrupling from 26 based jets in 2004 to 104 in 2025. As a result, facility planning must consider the more substantial space needs of these aircraft owners. Some corporate aircraft owners will prefer their own hangar facility.

An opportunity exists to accommodate the based aircraft fleet mix while providing optimal segregation of activity levels. The master plan recommends phasing-out the south side T-hangars/shade hangars over time and relocating them on the north side of the airfield. Through this process the south side of the airfield will gradually transition to primarily turboprop and jet activity. The north side can then focus on serving the majority of based aircraft operators utilizing smaller piston-powered aircraft.

No storage facilities of any kind have been planned to be removed without suitable replacement facilities being made available first. In fact, much of the south apron and taxiway pavements are in need of immediate repair and rehabilitation. Such rehabilitation is designed to improve drainage and to extend the life of the pavement at least five to 10 years. This rehabilitation is a high priority for both the City of Phoenix and the FAA, as maintenance of existing surfaces is a safety concern.

The master plan is a demand-based plan, meaning that projects will be undertaken based more upon actual need (demand) rather than any predicted point in time. Therefore, a one time mass relocation of hangars is not ex-

pected. The Aviation Department has recently prepared a 40-acre parcel in the southeast corner of the airport to accommodate corporate hangars. It is expected that the parcels in this area will be almost fully leased prior to considering the relocation any existing T-hangars for corporate hangar development. The first south T-hangar relocations are likely to be dependent upon FBO/specialty operator needs for additional lease space on the south side.

No T-hangar positions would be relocated until additional need for space for the types of uses outlined above materializes. Even if all of the T-hangars are eventually relocated to the north side, it will not preclude the use of the south side by small general aviation aircraft. The existing flight schools will likely remain on the south side. It is anticipated that some corporate users will have small aircraft in their fleet. Although FBOs are expected to develop to serve the north side, many transient small aircraft are expected to continue to utilize FBOs on the south side. FBOs and specialty operators on the south side will continue to utilize small aircraft, as well as use available space within their leaseholds to store small aircraft.

As the south side T-hangars/shade hangars are relocated to the north, these areas would be redeveloped as corporate aviation parcels. As identified on **Exhibit 5A**, each parcel is approximately two acres in size. A total of 14 parcels with taxiway access are proposed. The easternmost parcel is located directly to the south of the hangars currently occupied by the Phoenix Police Depart-

ment. This would be an ideal location for expansion or another aviation-related public safety function.

The south side T-hangars and shade hangars are some of the oldest on the airport. While they are not in poor condition at the present time, they are the hangars most likely to require more maintenance and upkeep first. When the need arises to relocate a T-hangar or shade hangar, the Aviation Department will weigh the options of reassembling the same hangar structure on the north side versus a full replacement.

The primary long term benefit of locating corporate parcels and services on the south side of the airfield is one of enhanced safety. Business jets are likely to utilize the primary runway as it provides the necessary runway length. By locating hangars and services for these airport users on the south side, the number and frequency of runway crossings is reduced. This in turn reduces the potential for runway incursions. The same safety enhancement would be realized by the operators of smaller piston powered aircraft that are more likely to utilize the parallel runway. These users would experience shorter taxi times and fewer runway crossings when the north side is the destination from the parallel runway.

The south side development also considers two airport service areas, east and west of the main apron. Each would provide approximately 16,000 square yards of new apron fronting two large 150-foot by 150-foot conventional hangars. These areas could accommo-

date expansion by current or new airport aviation-related businesses.

North side development plans further promote the separation of activity levels. A total of 1,146 T-hangars/shade hangars units would be provided. In addition, 190 box hangar positions are also planned to satisfy a demand for an intermediate hangar type between the smaller T-hangars/shade hangars and the large conventional hangars. The box/executive hangars could have more amenities than a T-hangar/shade hangar, such as water and sewer extension and perhaps a small office space.

To accommodate the service needs of the tenants of north side hangars, a large airport services area is considered to the immediate west of the new airport traffic control tower. This area includes 10 conventional hangars measuring 150 feet by 150 feet as well as two 200-foot by 200-foot hangars. These hangars should be considered for development by current or new airport business operators.

Included in aviation services development is a central general aviation services building. This building would be intended to supplement the services offered in the existing terminal building and serve as a central gathering place for aircraft operators utilizing north side services. Some space could be developed to provide for a pilots' lounge, flight planning, concessions, and other leasable space could be made available.

The north side facilities plan includes an area for a self-serve fuel island

which will be installed in 2007. This is an amenity that many pilots of smaller aircraft prefer and have requested. A north side aircraft wash rack coupled with a dedicated facility for individuals to perform maintenance on their aircraft is planned immediately south of the newly relocated FAA ATCT.

The recommended plan is designed to provide a balance of operational activity on both sides of the airport. The north side of the airport has the most acreage and it is directly adjacent to the shorter north runway. This makes the north side most suitable for storage of the largest number of aircraft on the airport, which will continue to be small general aviation aircraft. Since many of these aircraft are individually owned and operated, they are not all utilized on an everyday basis. Thus, the operations generated per stored aircraft on the north side will be significantly smaller than that of the corporate aircraft and flight school aircraft that are planned to be stored within the smaller land area on the south side of the airport.

Small general aviation aircraft also have the ability to regularly utilize the shorter parallel runway, whereas many of the business jets cannot. The parallel runway is planned for an extension which will make it reliable for small aircraft even on the hottest days. While it will also provide at least some back-up capability for business jets, its use by these aircraft would still be limited.

This will not preclude aircraft from the north side from using the south runway.

In fact, the master plan includes several improvements to make the south runway more accessible from the north side, such as extending Taxiway B to the west end of Runway 7R. Additional taxiway exits to the north are planned for both runways, as well as expanded holding areas.

The master plan evaluated alternatives for storing corporate jet aircraft on the north side. These alternatives have the potential for compounding delays as the vast majority of the corporate jet aircraft would have to cross the north runway to get to and from the south runway. From a function and efficiency standpoint, it makes far more sense to store the larger aircraft that are operating daily adjacent to the runway they will be using 90 to 95 percent of the time. Therefore, the corporate hangars are planned on the south side of Runway 7R-25L, the primary runway.

Landside Summary

South Side Recommendations

- Phase-out south side T-hangars and redevelop as corporate aviation parcels. Provide replacement T-hangar facilities on the north side prior to redevelopment of the south side.
- Expand airport services area with the addition of approximately 32,000 square yards of apron, four conventional hangars, and automobile parking.
- Reconstruct main aircraft ramp.

North Side Recommendations

- Provide for the development of approximately 377 T-hangar and 300 shade hangar positions east of the existing T-hangars.
- Provide for the development of approximately 190 box/executive hangars west of the existing T-hangars.
- Provide for the development of approximately 12 airport service han-

gars, with an estimated capacity of 66 aircraft positions, and a general aviation services building to the west of the existing T-hangars.

- Provide for the development of a self-service fuel island and a wash rack/self-maintenance facility.

Table 5C presents a summary of the number of aircraft storage positions being provided by the recommended concept.

Hangar Types	North Side		South Side		Airport Totals		Net Increase
	Existing	Ultimate	Existing	Ultimate	Existing	Ultimate	
INDIVIDUAL HANGAR POSITIONS							
T-Hangars	469	846	299	-	768	846	78
Shade Hangars	-	300	248	-	248	300	52
Executive/Box Hangars	-	190	4	4	4	194	190
Subtotal	469	1,336	551	4	1,020	1,340	320
MULTI-AIRCRAFT HANGAR POSITIONS							
Conventional Hangars	-	66	47	61	47	127	80
Corporate Parcels	-	-	-	87	-	87	87
Subtotal	-	66	47	148	47	214	167
Total Positions	469	1,402	598	152	1,067	1,554	487

SUMMARY

The recommended master plan concept has been developed in conjunction with the Planning Advisory Committee, airport management, tenant representation, and numerous City officials, and is designed to assist in making decisions on the future development and growth of Phoenix Deer Valley Airport. This plan provides the necessary development to accommodate and satisfy the anticipated growth over the next 20 years and beyond.

Flexibility will be very important to future development at the airport. Activ-

ity projected over the next 20 years may not occur as predicted. The plan has attempted to consider demands that may be placed on the airport even beyond the 20-year planning horizon to ensure that the facility will be capable of handling a wide range of circumstances. The recommended plan provides the airport stakeholders with a general guide that, if followed, can maintain the airport's long term viability and allow the airport to continue to provide air transportation service to the region.